for each of said plurality of light sources, comparing at least a portion of said observer data with at least a portion of said lighting data to determine if a modeled point within said scene is illuminated by said light source and storing at least a portion of said light image data associated with said point and said light source in a light accumulation buffer; and then

combining at least a portion of said light accumulation buffer with said observer data; and

[displaying] <u>outputting</u> resulting image data [to a computer screen].

Please add the following new Claims.

2. ~~49.~~ (New) The method as recited in Claim 1, wherein said observer data includes observed color data and observed depth data associated with a plurality of modeled polygons within said scene as rendered from an observer's perspective.

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3. ~~50.~~ (New) The method as recited in Claim ~~49~~ 1, wherein said plurality of modeled polygons within said scene are associated with at least one pixel, such that said observed color data includes an observed red-green-blue value for said pixel and said observed depth data includes an observed z-buffer value for said pixel.

4. ~~51.~~ (New) The method as recited in Claim ~~49~~ 1, wherein said lighting data includes source color data associated with at least one of said light sources and source depth data associated with said plurality of modeled polygons within said scene as rendered from a plurality

B

of different light source's perspectives.

5. ~~52.~~ (New) The method as recited in Claim 4 ~~51~~, wherein said plurality of modeled polygons within said scene are associated with at least one pixel, such that said source color data includes a source red-green-blue value for said pixel and said source depth data includes a source z-buffer value for said pixel.

B1 cont.

6. ~~53.~~ (New) The method as recited in Claim 4 ~~51~~, wherein the step of comparing at least a portion of said observer data with at least a portion of said lighting data to determine if a modeled point within said scene is illuminated by said light source further includes comparing at least a portion of said observed depth data with at least a portion of said source depth data to determine if said modeled point is illuminated by said light source.

7. ~~54.~~ (New) The method as recited in Claim 6 ~~53~~, wherein the step of comparing at least a portion of said observed depth data with at least a portion of said source depth data to determine if said modeled point is illuminated by said light source further includes converting at least a portion of said observed depth data from said observer's perspective to at least one of said plurality of different light source's perspectives, before comparing said observed depth data with said source depth data.

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8. ~~55.~~ (New) The method as recited in Claim 7. ~~54,~~ wherein the step of converting at least a portion of said observed depth data from said observer's perspective to at least one of said plurality of different light source's perspectives further includes using a precalculated matrix transformation look-up table for at least one of said plurality of light sources, when said light source has a fixed perspective of said scene.

B1 Cont

9. ~~56.~~ (New) The method as recited in Claim 1 ~~49,~~ wherein at least a portion of said source color data is selectively controlled source color data that can be changed over a period of time during which at least the step of outputting the resulting image data is repeated a plurality of times.

10. ~~57.~~ (New) The method as recited in Claim 9 ~~56,~~ wherein said controlled source color data includes data selected from a set comprising motion picture data, video data, animation data, and computer graphics data.

11. ~~58.~~ (New) An arrangement configured to render shadows in a simulated multi-dimensional scene, the arrangement comprising:

an output to a display screen configured to display image data;

memory for storing data including observer data associated with a simulated multi-dimensional scene, and lighting data associated with a plurality of simulated light sources

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arranged to illuminate said scene, said lighting data including light image data, said memory further including a light accumulation buffer portion and a frame buffer portion;

at least one processor coupled to said memory and said output and operatively configured to, for each of said plurality of light sources, compare at least a portion of said observer data with at least a portion of said lighting data to determine if a modeled point within said scene is illuminated by said light source and storing at least a portion of said light image data associated with said point and said light source in said light accumulation buffer, then combining at least a portion of said light accumulation buffer with said observer data, and storing resulting image data in said frame buffer, and outputting at least a portion of said image data in said frame buffer via said output.

B1 cont.

12. ~~59.~~ (New) The arrangement as recited in Claim ~~58~~ 11, wherein said observer data includes observed color data and observed depth data associated with a plurality of modeled polygons within said scene as rendered from an observer's perspective.

Sub C1

~~60. (New) The arrangement as recited in Claim 59, wherein said plurality of modeled polygons within said scene are associated with at least one pixel on said display screen, such that said observed color data includes an observed red-green-blue value for said pixel and said observed depth data includes a observed z-buffer value for said pixel..~~

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14. ~~61~~. (New) The arrangement as recited in Claim 12 ~~59~~, wherein said lighting data includes source color data associated with at least one of said light sources and source depth data associated with said plurality of modeled polygons within said scene as rendered from a plurality of different light source's perspectives.

15. ~~62~~. (New) The arrangement as recited in Claim 14 ~~61~~, wherein said plurality of modeled polygons within said scene are associated with at least one pixel, such that said source color data includes a source red-green-blue value for said pixel and said source depth data includes a source z-buffer value for said pixel.

B1 cont

16. ~~63~~. (New) The arrangement as recited in Claim 14 ~~61~~, wherein said processor is further configured to compare at least a portion of said observed depth data with at least a portion of said source depth data to determine if said modeled point is illuminated by said light source.

17. ~~64~~. (New) The arrangement as recited in Claim 16 ~~63~~, wherein said processor is further configured to convert at least a portion of said observed depth data from said observer's perspective to at least one of said plurality of different light source's perspectives, before comparing said observed depth data with said source depth data.

18. ~~65~~. (New) The arrangement as recited in Claim 17 ~~64~~, wherein said memory further

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includes at least one precalculated matrix transformation table associated with at least one of said plurality of light sources, and said processor is further configured to use said precalculated matrix transformation look-up table when said light source is simulated as having a fixed perspective of said scene.

19. ~~66.~~ (New) The arrangement as recited in Claim ~~61~~ 14, wherein said processor is further configured to selectively control at least a portion of said source color data over a period of time.

B cont.

20. ~~67.~~ (New) The arrangement as recited in Claim ~~66~~ 19, wherein said controlled source color data includes data selected from a set comprising motion picture data, video data, animation data, and computer graphics data.

21. ~~68.~~ (New) A computer-readable medium carrying at least one set of computer instructions configured to cause a computer to operatively simulate light falling on a modeled object in a computer generated multi-dimensional graphics simulation by performing operations comprising:

a) rendering an observer view of at least a portion of a spatially modeled object as a plurality of observed depth values and observed image values;

b) rendering a source view of at least a portion of said modeled object as a plurality of source depth values and a plurality of source image values;

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c) transforming at least a portion of said observed depth values to said source view;

d) modifying at least one image accumulation value with one of said observed image values if said corresponding transformed observer value is equal to a comparable one of said source depth values;

e) multiplying said one of said observed image values by said at least one image accumulation value to produce at least one pixel value; and

f) output said pixel value to a computer screen .

B' cont.

22. ~~69.~~ (New) The computer-readable medium as recited in Claim 21 ~~68;~~ further configured to cause tcomputer to perform the further step of:

g) following step d), repeating steps b) through d) for at least one additional source view.

23. ~~70.~~ (New) The computer-readable medium as recited in Claim 22 ~~69,~~ further configured to cause the computer to perform the further steps of:

h) repeating steps a) through g) a frame rate; and

wherein step f) further includes sequentially outputting a plurality of pixels as frames of data to said computer screen at said frame rate, and said step of rendering said source view further includes changing at least one of said source image values between said subsequent frames of data.

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24. ~~71.~~ (New) The computer-readable medium as recited in Claim ~~70~~ ~~27~~ 23 wherein at least a portion of said source image values represent color data selected from a set comprising motion picture data, video data, animation data, and computer graphics data.

25. ~~72.~~ (New) The computer-readable medium as recited in Claim ~~70~~ ~~27~~ 23, wherein step c) further includes transforming at least a portion of said observed depth values from an observer coordinate system to a corresponding source coordinate system.

B1 cont.

26. ~~73.~~ (New) The computer-readable medium as recited in Claim ~~72~~ 25, wherein the step of transforming at least a portion of said observed depth values from an observer coordinate system to a corresponding source coordinate system further includes using a precalculated transformation table to transform directly from said observer coordinate system to said corresponding source coordinate system.

27. ~~74.~~ (New) A computer-readable medium carrying at least one set of computer instructions configured to cause at least one processor to operatively render simulated shadows in a multi-dimensional simulated scene by performing the steps of:

providing observer data of a simulated multi-dimensional scene;

providing lighting data associated with a plurality of simulated light sources arranged to

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illuminate said scene, said lighting data including light image data;

for each of said plurality of light sources, comparing at least a portion of said observer data with at least a portion of said lighting data to determine if a modeled point within said scene is illuminated by said light source and storing at least a portion of said light image data associated with said point and said light source in a light accumulation buffer; and then

combining at least a portion of said light accumulation buffer with said observer data; and

outputting resulting image data to a computer screen.

B1 cont.

28. ~~75.~~ (New) The computer-readable medium as recited in Claim 27 ~~74~~, wherein said observer data includes observed color data and observed depth data associated with a plurality of modeled polygons within said scene as rendered from an observer's perspective.

29. ~~76.~~ (New) The computer-readable medium as recited in Claim 28 ~~75~~, wherein said plurality of modeled polygons within said scene are associated with at least one pixel, such that said observed color data includes an observed red-green-blue value for said pixel and said observed depth data includes a observed z-buffer value for said pixel.

30. ~~77.~~ (New) The computer-readable medium as recited in Claim 28 ~~75~~, wherein said lighting data includes source color data associated with at least one of said light sources and source depth data associated with said plurality of modeled polygons within said scene as

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rendered from a plurality of different light source's perspectives.

31. ~~78~~. (New) The computer-readable medium as recited in Claim 28 ~~75~~, wherein said plurality of modeled polygons within said scene are associated with at least one pixel on said computer screen, such that said source color data includes a source red-green-blue value for said pixel and said source depth data includes a source z-buffer value for said pixel.

32. ~~79~~. (New) The computer-readable medium as recited in Claim 30 ~~77~~, wherein the step of comparing at least a portion of said observer data with at least a portion of said lighting data to determine if a modeled point within said scene is illuminated by said light source further includes comparing at least a portion of said observed depth data with at least a portion of said source depth data to determine if said modeled point is illuminated by said light source.

B1 cont

33. ~~80~~. (New) The computer-readable medium as recited in Claim 32 ~~79~~, wherein the step of comparing at least a portion of said observed depth data with at least a portion of said source depth data to determine if said modeled point is illuminated by said light source further includes converting at least a portion of said observed depth data from said observer's perspective to at least one of said plurality of different light source's perspectives, before comparing said observed depth data with said source depth data.

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~~81~~ 34. (New) The computer-readable medium as recited in Claim ~~80~~ 33, wherein the step of converting at least a portion of said observed depth data from said observer's perspective to at least one of said plurality of different light source's perspectives further includes using a precalculated matrix transformation look-up table for at least one of said plurality of light sources, when said light source has a fixed perspective of said scene.

B1 cont'd.

~~82~~ 35. (New) The computer-readable medium as recited in Claim ~~77~~ 30, wherein at least a portion of said source color data is selectively controlled source color data that can be changed over a period of time during which at least the step of outputting the resulting image data to said computer screen is repeated a plurality of times.

~~83~~ 36. (New) The computer-readable medium as recited in Claim ~~82~~ 35, wherein said controlled source color data includes data selected from a set comprising motion picture data, video data, animation data, and computer graphics data.--

CLEAN VERSION OF CLAIMS AFTER PRELIMINARY AMENDMENT

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1. (Amended) A shadow rendering method, the method comprising the steps of:

providing observer data of a simulated multi-dimensional scene;

providing lighting data associated with a plurality of simulated light sources arranged to illuminate said scene, said lighting data including light image data;

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for each of said plurality of light sources, comparing at least a portion of said observer data with at least a portion of said lighting data to determine if a modeled point within said scene is illuminated by said light source and storing at least a portion of said light image data associated with said point and said light source in a light accumulation buffer; and then

combining at least a portion of said light accumulation buffer with said observer data; and

outputting resulting image data.

49. (New) The method as recited in Claim 1, wherein said observer data includes observed color data and observed depth data associated with a plurality of modeled polygons within said scene as rendered from an observer's perspective.

50. (New) The method as recited in Claim 49, wherein said plurality of modeled polygons within said scene are associated with at least one pixel, such that said observed color data includes an observed red-green-blue value for said pixel and said observed depth data includes an observed z-buffer value for said pixel.

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51. (New) The method as recited in Claim 49, wherein said lighting data includes source color data associated with at least one of said light sources and source depth data associated with said plurality of modeled polygons within said scene as rendered from a plurality of different light source's perspectives.

52. (New) The method as recited in Claim 51, wherein said plurality of modeled polygons within said scene are associated with at least one pixel, such that said source color data includes a source red-green-blue value for said pixel and said source depth data includes a source z-buffer value for said pixel.

53. (New) The method as recited in Claim 51, wherein the step of comparing at least a portion of said observer data with at least a portion of said lighting data to determine if a modeled point within said scene is illuminated by said light source further includes comparing at least a portion of said observed depth data with at least a portion of said source depth data to determine if said modeled point is illuminated by said light source.

54. (New) The method as recited in Claim 53, wherein the step of comparing at least a portion of said observed depth data with at least a portion of said source depth data to determine if said modeled point is illuminated by said light source further includes converting at least a portion of said observed depth data from said observer's perspective to

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at least one of said plurality of different light source's perspectives, before comparing said observed depth data with said source depth data.

55. (New) The method as recited in Claim 54, wherein the step of converting at least a portion of said observed depth data from said observer's perspective to at least one of said plurality of different light source's perspectives further includes using a precalculated matrix transformation look-up table for at least one of said plurality of light sources, when said light source has a fixed perspective of said scene.

56. (New) The method as recited in Claim 49, wherein at least a portion of said source color data is selectively controlled source color data that can be changed over a period of time during which at least the step of outputting the resulting image data is repeated a plurality of times.

57. (New) The method as recited in Claim 56, wherein said controlled source color data includes data selected from a set comprising motion picture data, video data, animation data, and computer graphics data.

58. (New) An arrangement configured to render shadows in a simulated multi-dimensional scene, the arrangement comprising:

an output to a display screen configured to display image data;

memory for storing data including observer data associated with a simulated multi-dimensional scene, and lighting data associated with a plurality of simulated light sources arranged to illuminate said scene, said lighting data including light image data, said memory further including a light accumulation buffer portion and a frame buffer portion;

at least one processor coupled to said memory and said output and operatively configured to, for each of said plurality of light sources, compare at least a portion of said observer data with at least a portion of said lighting data to determine if a modeled point within said scene is illuminated by said light source and storing at least a portion of said light image data associated with said point and said light source in said light accumulation buffer, then combining at least a portion of said light accumulation buffer with said observer data, and storing resulting image data in said frame buffer, and outputting at least a portion of said image data in said frame buffer via said output.

59. (New) The arrangement as recited in Claim 58, wherein said observer data includes observed color data and observed depth data associated with a plurality of modeled polygons within said scene as rendered from an observer's perspective.

60. (New) The arrangement as recited in Claim 59, wherein said plurality of modeled polygons within said scene are associated with at least one pixel on said display screen, such that said observed color data includes an observed red-green-blue value for said pixel and said observed depth data includes a observed z-buffer value for said pixel..

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61. (New) The arrangement as recited in Claim 59, wherein said lighting data includes source color data associated with at least one of said light sources and source depth data associated with said plurality of modeled polygons within said scene as rendered from a plurality of different light source's perspectives.

62. (New) The arrangement as recited in Claim 61, wherein said plurality of modeled polygons within said scene are associated with at least one pixel, such that said source color data includes a source red-green-blue value for said pixel and said source depth data includes a source z-buffer value for said pixel.

63. (New) The arrangement as recited in Claim 61, wherein said processor is further configured to compare at least a portion of said observed depth data with at least a portion of said source depth data to determine if said modeled point is illuminated by said light source.

64. (New) The arrangement as recited in Claim 63, wherein said processor is further configured to convert at least a portion of said observed depth data from said observer's perspective to at least one of said plurality of different light source's perspectives, before comparing said observed depth data with said source depth data.

65. (New) The arrangement as recited in Claim 64, wherein said memory further includes at least one precalculated matrix transformation table associated with at least one of said plurality of light sources, and said processor is further configured to use said precalculated matrix transformation look-up table when said light source is simulated as having a fixed perspective of said scene.

66. (New) The arrangement as recited in Claim 61, wherein said processor is further configured to selectively control at least a portion of said source color data over a period of time.

67. (New) The arrangement as recited in Claim 66, wherein said controlled source color data includes data selected from a set comprising motion picture data, video data, animation data, and computer graphics data.

68. (New) A computer-readable medium carrying at least one set of computer instructions configured to cause a computer to operatively simulate light falling on a modeled object in a computer generated multi-dimensional graphics simulation by performing operations comprising:

a) rendering an observer view of at least a portion of a spatially modeled object as a plurality of observed depth values and observed image values;

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b) rendering a source view of at least a portion of said modeled object as a plurality of source depth values and a plurality of source image values;

c) transforming at least a portion of said observed depth values to said source view;

d) modifying at least one image accumulation value with one of said observed image values if said corresponding transformed observer value is equal to a comparable one of said source depth values;

e) multiplying said one of said observed image values by said at least one image accumulation value to produce at least one pixel value; and

f) output said pixel value to a computer screen .

69. (New) The computer-readable medium as recited in Claim 68, further configured to cause tcomputer to perform the further step of:

g) following step d), repeating steps b) through d) for at least one additional source view.

70. (New) The computer-readable medium as recited in Claim 69, further configured to cause the computer to perform the further steps of:

h) repeating steps a) through g) a frame rate; and

wherein step f) further includes sequentially outputting a plurality of pixels as frames of data to said computer screen at said frame rate, and said step of rendering said source view

further includes changing at least one of said source image values between said subsequent frames of data.

71. (New) The computer-readable medium as recited in Claim 70 wherein at least a portion of said source image values represent color data selected from a set comprising motion picture data, video data, animation data, and computer graphics data.

72. (New) The computer-readable medium as recited in Claim 70, wherein step c) further includes transforming at least a portion of said observed depth values from an observer coordinate system to a corresponding source coordinate system.

73. (New) The computer-readable medium as recited in Claim 72, wherein the step of transforming at least a portion of said observed depth values from an observer coordinate system to a corresponding source coordinate system further includes using a precalculated transformation table to transform directly from said observer coordinate system to said corresponding source coordinate system.

74. (New) A computer-readable medium carrying at least one set of computer instructions configured to cause at least one processor to operatively render simulated shadows in a multi-dimensional simulated scene by performing the steps of:

providing observer data of a simulated multi-dimensional scene;

providing lighting data associated with a plurality of simulated light sources arranged to illuminate said scene, said lighting data including light image data;

for each of said plurality of light sources, comparing at least a portion of said observer data with at least a portion of said lighting data to determine if a modeled point within said scene is illuminated by said light source and storing at least a portion of said light image data associated with said point and said light source in a light accumulation buffer; and then

combining at least a portion of said light accumulation buffer with said observer data; and

outputting resulting image data to a computer screen.

75. (New) The computer-readable medium as recited in Claim 74, wherein said observer data includes observed color data and observed depth data associated with a plurality of modeled polygons within said scene as rendered from an observer's perspective.

76. (New) The computer-readable medium as recited in Claim 75, wherein said plurality of modeled polygons within said scene are associated with at least one pixel, such that said observed color data includes an observed red-green-blue value for said pixel and said observed depth data includes a observed z-buffer value for said pixel.

77. (New) The computer-readable medium as recited in Claim 75, wherein said lighting data includes source color data associated with at least one of said light sources and source depth data associated with said plurality of modeled polygons within said scene as rendered from a plurality of different light source's perspectives.

78. (New) The computer-readable medium as recited in Claim 75, wherein said plurality of modeled polygons within said scene are associated with at least one pixel on said computer screen, such that said source color data includes a source red-green-blue value for said pixel and said source depth data includes a source z-buffer value for said pixel.

79. (New) The computer-readable medium as recited in Claim 77, wherein the step of comparing at least a portion of said observer data with at least a portion of said lighting data to determine if a modeled point within said scene is illuminated by said light source further includes comparing at least a portion of said observed depth data with at least a portion of said source depth data to determine if said modeled point is illuminated by said light source.

80. (New) The computer-readable medium as recited in Claim 79, wherein the step of comparing at least a portion of said observed depth data with at least a portion of said source depth data to determine if said modeled point is illuminated by said light source further includes converting at least a portion of said observed depth data from said observer's

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perspective to at least one of said plurality of different light source's perspectives, before comparing said observed depth data with said source depth data.

81. (New) The computer-readable medium as recited in Claim 80, wherein the step of converting at least a portion of said observed depth data from said observer's perspective to at least one of said plurality of different light source's perspectives further includes using a precalculated matrix transformation look-up table for at least one of said plurality of light sources, when said light source has a fixed perspective of said scene.

82. (New) The computer-readable medium as recited in Claim 77, wherein at least a portion of said source color data is selectively controlled source color data that can be changed over a period of time during which at least the step of outputting the resulting image data to said computer screen is repeated a plurality of times.

83. (New) The computer-readable medium as recited in Claim 82, wherein said controlled source color data includes data selected from a set comprising motion picture data, video data, animation data, and computer graphics data.